

CLAIMS

1. A mask pad device for a breathing mask comprising a receiving opening which in the position of application of the breathing mask coincides at least with the nose and/or mouth opening region of a user of the mask, and a sealing lip which is formed from an elastomer material and which extends around the receiving opening and which in the application position fits on the surface of the face of the user of the mask, characterised in that at least one zone of thickened cross-section is provided in the mask pad and that the mask pad material of said zone of thickened cross-section has different material properties in such a way that the Shore hardness of the mask pad in the edge region of the zone of thickened cross-section is higher than in the region which is at the core or at least near the core, of the zone of thickened cross-section.
2. A mask pad device according to claim 1 characterised in that the Shore hardness of the mask pad in the region of the zones which in the application position are near the forehead or the bridge of the nose is lower than in the region of the peripheral zones near the cheeks, top lip or sides of the nose.
3. A mask pad device according to claim 2 characterised in that in the core region of the zones of thickened cross-section the material has gel-like material properties.
4. A mask pad device according to at least one of claims 1 to 3 characterised in that the different material properties in the region of the zones of thickened cross-section are caused by differing degrees of crosslinking of the material.
5. A mask pad device according to at least one of claims 1 to 4 characterised in that the zones of thickened cross-section adjoin the sealing lip.

6. A mask pad device according to at least one of claims 1 to 5 characterised in that the zone of thickened cross-section in the application position is seated at least portion-wise on the surface of the face of the user of the mask.

7. A mask pad device according to at least one of claims 1 to 6 characterised in that the zone of thickened cross-section in the application position is seated at least portion-wise on the inward side of the face sealing lip, which is remote from the surface of the face of the user of the mask.

8. A mask pad device according to at least one of claims 1 to 7 characterised in that the zones of thickened cross-section are formed from at least two elastomer compound materials which are prepared differently.

9. A mask pad device according to at least one of claims 1 to 8 characterised in that it is adapted to be fitted to a dish-shaped body formed by a hard shell member.

10. A mask pad device according to at least one of claims 1 to 9 characterised in that the sealing pad device is formed integrally with the dish-shaped body.

11. A mask pad device according to at least one of claims 1 to 10 characterised in that the zones of thickened cross-section is resiliently yieldingly suspended in the application direction at least in portion-wise manner.

12. A mask pad device according to at least one of claims 1 to 11 characterised in that the sealing lip is resiliently coupled by way of a folding structure to the zone of thickened cross-section.

13. A breathing mask comprising a dish-shaped body which in the application position engages over the nose and/or mouth region of a user of the mask and a mask pad device according to at least one of claims 1 to 12.

14. A breathing mask according to claim 13 characterised in that the dish-shaped body is formed integrally with the sealing pad device.

15. A breathing mask according to claim 14 characterised in that the dish-shaped body is formed by a hard shell member.

16. A process for the production of a mask pad device of a breathing mask in which in the context of a step of introducing elastomer material, the elastomer material is introduced into a mask pad mould cavity, wherein the temperature distribution of the inside wall of the mould cavity and the mould closing time are so controlled that the elastomer material which is crosslinked to form the mask pad device in the mould cavity attains different Shore hardness values.

17. A process according to claim 16 characterised in that the temperature profile of the inside wall of the mould cavity is controlled in such a way that the sealing pad device formed in the mould cavity has different Shore hardness values in the configuration thereof in the peripheral direction.

18. A process according to claim 16 or claim 17 characterised in that the temperature profile is so controlled that the mask pad device attains lower Shore hardness values in a region which in the application position is near the forehead or the bridge of the nose.

19. A process according to one of claims 16 to 18 characterised in that the temperature profile of the inside wall of the mould cavity during the step of introducing elastomer material has a first temperature profile

characteristic and that the temperature characteristic is altered during the mould closing time.

20. A process according to claim 19 characterised in that the temperature profile during the step of introducing elastomer material has a first, in particular constant high-temperature distribution, and that during the mould closing time selected zones of the inside wall of the mould cavity are cooled to lower temperatures.

21. A moulding tool for the production of a mask pad device comprising an internal mould cavity delimited in the tool closed position by an inside wall of the mould cavity and which is complementary with respect to the mask pad device to be formed, and a heating device for heating the inside wall of the mould cavity, characterised in that the moulding tool is so designed that a predetermined temperature profile is produced at the inside wall of the mould cavity.

22. A moulding tool according to claim 21 characterised in that the temperature profile can be adjusted in such a way that the mould cavity temperature in a mould cavity portion for forming a portion of the mask pad device, which seals off the forehead region or the region of the bridge of the nose, is lower than the temperature in a mould cavity portion provided for forming a top lip or chin sealing region of the mask pad device.

23. A moulding tool according to one of claims 19 and 20 characterised in that it includes cooling devices for cooling selected portions of the moulding tool.

24. A moulding tool according to at least one of claims 19 to 21 characterised in that the temperature profile is variable during the mould closing time.

25. A mask pad device for a breathing mask comprising a receiving opening which in the position of application of the breathing mask coincides at least with the nose and/or mouth opening region of a user of the mask, and a sealing lip which is formed from an elastomer material and which extends around the receiving opening and which in the application position fits on the surface of the face of the user of the mask, characterised in that at least one zone of thickened cross-section is provided in the mask pad and that the mask pad material of said zone of thickened cross-section is foamed in such a way that in the region of the zone of thickened cross-section the mask pad forms a foam cushion.

26. A mask pad device for a breathing mask comprising a receiving opening which in the position of application of the breathing mask coincides at least with the nose and/or mouth opening region of a user of the mask, and a sealing lip which is formed from an elastomer material and which extends around the receiving opening and which in the application position fits on the surface of the face of the user of the mask, characterised in that at least one zone of thickened cross-section is provided in the inner region of the mask pad and that the mask pad material of said zone of thickened cross-section has gel-like material properties, wherein the zone of thickened cross-section is formed by insertion of a gel-like crosslinked elastomer body into a fixing structure provided in the internal space of the mask pad device.

27. A mask pad device according to claim 26 characterised in that the gel-like crosslinked body thereof is of a horseshoe-like configuration and in the application position extends over the bridge of the nose of the user of the mask.

28. A mask pad device according to claim 26 characterised in that the gel-like crosslinked body thereof is of a ring-like configuration, following the sealing lip, extending around a mouth and/or nose opening.

29. A mask pad device for a breathing mask comprising a receiving opening which in the position of application of the breathing mask coincides at least with the nose and/or mouth opening region of a user of the mask, and a sealing lip which is formed from an elastomer material and which extends around the receiving opening and which in the application position fits on the surface of the face of the user of the mask, characterised in that provided in the mask pad is at least one receiving pocket portion and provided in said receiving pocket portion is a cushion body comprising a gel or foam material, wherein the configuration of the pocket portion is established such that the sealing lip device defines a skin contact zone (GS1) in which the sealing lip device is urged against the surface of the face by the cushion body.

30. A mask pad device according to claim 29 characterised in that the cushion body is subdivided into segments.

31. A forehead pad for a breathing mask comprising a forehead pad base body which is made from an elastomer material and has a coupling portion for fixing the forehead pad to a forehead support device and a stem portion for radially yieldingly mounting a forehead contact portion provided for bearing against a forehead surface, wherein the forehead pad has a zone of thickened cross-section and in said zone is provided with a gel or foam material.

32. A sealing structure comprising a base body made from an elastomer profile material, wherein the base body has a profile cross-section with at least one zone of thickened cross-section and the elastomer material is processed in such a way that the Shore hardness of the profile material is higher in the edge region of the zone of thickened cross-section than in the core or in the region near the core of the zone of thickened cross-section.

33. A sealing structure according to claim 32 characterised in that in the core region of the zone of thickened cross-section the material has gel-like material properties.

34. A sealing structure according to claim 32 or claim 33 characterised in that the differing material properties in the region of the zone of thickened cross-section are caused by differing degrees of material crosslinking.

35. A sealing structure according to at least one of claims 32 to 34 characterised in that it includes a sealing lip and the zone of thickened cross-section adjoins the sealing lip.

36. A sealing structure according to at least one of claims 32 to 35 characterised in that the zone of thickened cross-section is formed from at least two differently prepared elastomer compound systems.

37. A sealing structure according to at least one of claims 32 to 36 characterised in that the sealing structure has a fixing profiling.

38. A sealing structure according to at least one of claims 32 to 37 characterised in that the sealing structure has a folding bellows portion which is formed integrally with the zone of thickened cross-section.

39. A process for the production of a sealing structure in which in the context of a step of introducing elastomer material the elastomer material is introduced into a sealing structure mould cavity or sealing extrusion passage, wherein the temperature distribution in the sealing structure mould cavity or in the extrusion passage as well as the residence time are matched in such a way that the elastomer material crosslinking to form the sealing structure acquires differing Shore hardnesses in the region of a zone of thickened cross-section.

40. A process according to claim 39 characterised in that in the core region of the zone of thickened cross-section crosslinking of the profile material is retarded or blocked.

41. A process according to claim 40 characterised in that retardation of the crosslinking procedure is delayed by UV exposure.

42. A process according to claim 41 characterised in that retardation of the crosslinking procedure is delayed by microwave irradiation.

43. A process according to claim 42 characterised in that retardation of the crosslinking procedure is delayed by electromagnetic radiation.

44. A process according to claim 43 characterised in that crosslinking in the region of the zone of thickened cross-section is retarded by injection of a catalysis blocker into the core region.